Abstract of the Disclosure

A method for the low temperature joining of similar and/or different phosphate glass by mating at low temperature glass components by an aqueous solution containing phosphorus. In preferred embodiments, the phosphate glasses are polished, cleaned, and brought together with the phosphate-containing solution between the polished surfaces. Vacuum may be applied to assist in making the joint. The composite is optionally heat treated to increase strength, chemical durability, and optical performance. The bond thereby formed has low birefringence, is strong, and is virtually photonically invisible. The joints now make possible, for example, substrates for virtually no loss signal splitters and other high-end optical components at low cost. Large hybrid performs substrates composed of multiple glass components may be prepared and segmented, providing an inexpensive novel substrate for the photonics industry. Active lasing phosphate glasses may be joined by the present invention method to passive non-lasing glasses for use in laser and related applications.